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Original Article

# PHYTOCHEMICAL SCREENING, GC-MS ANALYSIS AND BIOLOGICAL ACTIVITIYS OF *IPOMOEA ERIOCARPA* LEAF EXTRACTS

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**ABSTRACT**

The objective of this study was to investigate the insecticidal activity, anthelmintic activity, GC-MS analysis and the phytochemical screening of the petroleum ether (IEP) and ethanol (IEE) extracts of the aerial parts of *Ipomoea eriocarpa*. Qualitative phytochemical screening of the extract revealed the presence of alkaloids, phenols, saponins, phytosterols and terpenoids. In GC-MS analysis, eleven phytoconstituents were identified in the petroleum ether extract and nine phytoconstituents in the ethanol extracts of which three were common for both the extracts. Both the extracts exhibited potent insecticidal activity and good anthelmintic activity.

**Keywords:** Insecticidal activitiys, Anthelmintic activitiys, Phytochemical screening, GC-MS analysis.

## INTRODUCTION

*Ipomoea eriocarpa* R.Br. (Family: Convolvulaceae) often called annual morninglories and sanding sulo, are summer annual or perennial broadleaf plants. They are slender twining herb of grassland, waste spaces and a weed of cultivation. Cotyledons are butterfly shaped and more deeply notched and much larger than those of field bindweed. Mature plants have long stems that climb and twine. Leaves are large, heart shaped and/or three lobed, and are alternate to one another along the stem. Fruit are pods that release seeds through slits. Seeds germinate down to a depth of 4 inches or more, much deeper than most annuals. *Ipomoea eriocarpa* R.Br. are often cultivated as ornamentals, but under favorable conditions they can become troublesome weeds.

They occur throughout the Old World tropics, tropical Asia and North Australia. The plant has been successfully cultivated as an arable crop in India to provide green fodder for cattle. The plant has unspecified medicinal use in India.

The plant is occasionally consumed as an edible leafy vegetable or mixed with other food in Assam and is commonly known as "Kolmow" by them. An oil extract of the plant is used for external application in headache, rheumatism, leprosy, epilepsy, ulcers and fevers [1]. It is also applied to the neck-sores of bulls. An extensive literature survey revealed that the plant extract of *Ipomoea eriocarpa* was screened for its antioxidant [2], cerebroprotectivie [3], antisecretory [4], antipyretic [5], antinociceptive [6] and toxicity studies [7]. However, there are no reports on anthelmintic and insecticidal activity of the plant extracts. Hence, the present study was carried out to verify the claims of the native practitioners.

## MATERIALS AND METHODS

### Plant

The leaves of *Ipomoea eriocarpa* have been collected from Kamrup and Udalguri district of Assam, during the month of June, 2013 and dried under shade. The plant was identified as *Ipomoea eriocarpa* at the Botany Department, Gauhati University, Assam, consulting the available literature and herbarium study. The voucher specimen of the plant was deposited at the college for further reference.

### Extraction methods

Leaves of *Ipomoea eriocarpa* were shade dried and powdered to get coarse granules. The coarse powder was subjected to continuous hot extraction in Soxhlet apparatus using two solvents petroleum ether and ethanol. The petroleum ether extract (IEP) and ethanol extract (IEE) were concentrated under reduced pressure to produce a greenish sticky residue (9-14 % w/w). The concentrated crude extracts were stored and used for further study.

### Preliminary Phytochemical screening

A small portion of the dry extracts was screened for the presence of chemical constituents like alkaloids, carbohydrates, glycosides, phenols, saponins, phytosterols, flavanoids, proteins and terpenoids [8, 9].

### GC-MS analysis

The GC-MS analysis of the extracts was performed using a Perkin Elmer GC-MS (Model Perkin Elmer Clarus 600) equipped with an Elite-5 MS silica capillary column (30.0m × 0.25mm ID, 250µm df). The oven temperature was programmed at 60°C for 2 minutes then increased to 300° C for 6 minutes at the rate of 10°C/min. Helium was used as carrier gas at flow 1.0 ml/min.

The injector temperature was 250°C, injection size 1.0 µl neat, with split ratio 10:1. Mass detector turbo mass gold-Perkin Elmer was used as detector. The phytoconstituents were identified after comparison with those available in the computer library (NIST) attached to the instrument and reported.

### Insecticidal activity

Insecticidal activity was carried out on termites (*Coptotermes formosanus)* [10, 11]. 100 mg of each of the extracts was dissolved in 2 ml of acetone. The solution was uniformly spread on the filter paper of diameter 4.3 cm, dried and placed in a similar sized petri plates. Standard drug chloropyrifos and control was maintained in a similar way. The termites were placed on the filter paper in the petri plates which was then closed with the lid containing a thin layer of wet cotton bed. The death time of the insects was observed for 3 hrs. No death was observed in the control even after 12 hrs.

### Anthelmintic activity

Anthelmintic activity study was carried out against earthworms (*Eudrilus eugeniae*) [12, 13]. Suspension of the extracts was prepared by triturating the extracts with 15% Tween 80 and distilled water and the mixture was stirred using a magnetic stirrer for 30 minutes. The resulting suspension was used for the

activity studies. The suspension was diluted to contain 100 mg in 20 ml of the extracts. The standard drug, mebendazole was also prepared with the same concentration in a similar way. Earthworms were placed in three petri plates containing 20 ml of each extracts, standard drug and control (20 ml suspension of distilled water and 15% Tween 80) respectively at room temperature. The time required for the paralysis and death of the earthworms were noted. The death time was ascertained by placing the earthworms in warm water at 50oC, which stimulated the movement if the earthworms were alive.

## RESULTS AND DISCUSSION

### Preliminary Phytochemical screening

The two residues obtained were subjected to preliminary phytochemical screening for various compounds and the results showed that they contain mostly alkaloids, phenols, saponins, phytosterols and terpenoids (Table 1).

### GC-MS analysis

The GC-MS analysis of phytoconstituents in the leaves of *Ipomoea eriocarpa* revealed the presence of eleven phytoconstituents in IEP (Table 2) and nine phytoconstituents in IEE (Table 3) of which three were common for both the extracts

The major phytoconstituents found in IEP are Hentriacontane, Z,Z-6,28-heptatriactontadien-2-one, N-hexadecanoic acid, 3,7,11,15-tetramethyl-2-hexadecen-1-ol, Methyl-8,11,14-heptadecatrienoate, Hexacosanol acetate, (All-E)-2,6,10,15,19,23-hexamethyl-2,6,10,14,18,22-tetracosahexaene, (3-Beta)-ergost-5-en-3-ol, Methyl-2-hydroxy-eicosanoate, γ-sitosterol and 2R-acetoxymethyl-1,3,3-trimethyl-4t-(3-methyl-2-buten-1-yl)-1t-cyclohexanol.

The major phytoconstituents found in IEE are Hentriacontane, Z,Z-6,28-heptatriactontadien-2-one, 3,7,11,15-tetramethyl-2-hexadecen-1-ol, Ethyl-14-methyl-hexadecanoate, Ethyl-9,12,15-octadecatrienoate, 1,1-hexadecanediol, Stigmasterol, β-sitosterol and (-)-isolongifolol, trimethylsilyl ether.

Hentriacontane is reported to be an anti-inflammatory agent [14], Z,Z-6,28-heptatriactontadien-2-one a vasodilator [15] and 3,7,11,15-tetramethyl-2-hexadecen-1-ol as cancer-preventive.

N-hexadecanoic acid has properties like antibacterial, antioxidant, antitumor, immunostimulant, chemo preventive and lipoxygenase inhibitor [16, 17]. (3-Beta)-Ergost-5-en-3-ol, Stigmasterol and Beta-sitosterol have been clinically proved to reduce blood cholesterol and also have antioxidant properties [18].(All-E)-2,6,10,15,19,23-hexamethyl-2,6,10,14,18,22-tetra cosa hexaene has antibacterial, anti-inflammatory and antioxidant properties [19].

**Table 1: Phytochemical screening of *Ipomoea eriocarpa* leaf extracts**

| Test | IEP | IEE |
|---|---|---|
| Alkaloids | + | + |
| Carbohydrates | - | - |
| Glycosides | - | - |
| Saponins | - | + |
| Phytosterols | +++ | +++ |
| Flavanoids | - | - |
| Phenols | +++ | +++ |
| Proteins | - | - |
| Terpenoids | ++ | ++ |

**+** = Present, **-** = Absent

**Table 2: Constituents in IEP**

| Sl. No. | Name of the components | Mol. formula | MW |
|---|---|---|---|
| 1 | Hentriacontane | $C_{31}H_{64}$ | 436 |
| 2 | Z,Z-6,28-heptatriactontadien-2-one | $C_{37}H_{70}O$ | 530 |
| 3 | N-hexadecanoic acid | $C_{16}H_{32}O_2$ | 256 |
| 4 | 3,7,11,15-tetramethyl-2-hexadecen-1-ol | $C_{20}H_{40}O$ | 296 |
| 5 | Methyl-8,11,14-heptadecatrienoate | $C_{18}H_{30}O_2$ | 278 |
| 6 | Hexacosanol acetate | $C_{28}H_{56}O_2$ | 424 |
| 7 | (All-E)-2,6,10,15,19,23-hexamethyl-2,6,10,14,18,22-tetracosahexaene | $C_{30}H_{50}$ | 410 |
| 8 | (3-Beta)-ergost-5-en-3-ol | $C_{28}H_{48}O$ | 400 |
| 9 | Methyl-2-hydroxy-eicosanoate | $C_{21}H_{42}O_3$ | 342 |
| 10 | γ-sitosterol | $C_{29}H_{50}O$ | 414 |
| 11 | 2R-acetoxymethyl-1,3,3-trimethyl-4t-(3-methyl-2-buten-1-yl)-1t-cyclohexanol | $C_{17}H_{30}O_3$ | 282 |

**Table 3: Constituents in IEE**

| Sl. No. | Name of the components | Mol. formula | MW |
|---|---|---|---|
| 1 | Hentriacontane | $C_{31}H_{64}$ | 436 |
| 2 | Z,Z-6,28-heptatriactontadien-2-one | $C_{37}H_{70}O$ | 530 |
| 3 | 3,7,11,15-tetramethyl-2-hexadecen-1-ol | $C_{20}H_{40}O$ | 296 |
| 4 | Ethyl-14-methyl-hexadecanoate | $C_{19}H_{38}O_2$ | 298 |
| 5 | Ethyl-9,12,15-octadecatrienoate | $C_{20}H_{34}O_2$ | 306 |
| 6 | 1,1-hexadecanediol | $C_{16}H_{34}O_2$ | 258 |
| 7 | Stigmasterol | $C_{29}H_{48}O$ | 412 |
| 8 | β-sitosterol | $C_{29}H_{50}O$ | 414 |
| 9 | (-)-isolongifolol, trimethylsilyl ether | $C_{18}H_{34}OSi$ | 294 |

### Insecticidal activity

The results of the insecticidal activitiys of the extracts were compared with the standard (chloropyrifos). Both the extracts showed considerable insecticidal activity in comparison to the standard drug. Table 4 illustrates a significant insecticidal activity of prepared sample and the standard.

**Table 4: Insecticidal activitiys of the extracts**

| Sl. No. | Compounds | Concentration (mg/2 ml) | Death time (Mins) |
|---|---|---|---|
| 1 | IEP | 100 | 30 |
| 2 | IEE | 100 | 26 |
| 3 | Chloropyrifos | 100 | 23 |
| 4 | Control | - | - |

**Table 5: Anthelmintic activitiys of the extracts**

| Sl. No. | Compounds | Concentration (mg/20 ml) | Paralyzing time (Mins. Sec.) | Death time (Mins. Sec.) |
|---|---|---|---|---|
| 1 | IEP | 100 | 60 | 63.4 |
| 2 | IEE | 100 | 56.3 | 59.2 |
| 3 | Mebendazole | 100 | 54.2 | 56 |
| 4 | Control | - | - | - |

**Anthelmintic activity**

The anthelmintic activity studies of the two extracts were compared with the standard drug, mebendazole and it revealed that both the extracts possess potent anthelmintic activitiys. The results of the anthelmintic activitiys of the prepared sample and the standard are illustrated in Table 5.

**CONCLUSION**

The leaf extracts obtained gave good yield ranging from 9% to 14% w/w. The two extracts were tested for preliminary phytochemical constituents and the result obtained showed that they contain mostly alkaloids, phenols, saponins, phytosterols and terpenoids. The GC-MS analysis of IEP revealed the presence of eleven phytoconstituents and IEE revealed the presence of nine phytoconstituents of which three were common in both of the extracts. Insecticidal activity study of both the extracts showed considerable insecticidal activity in comparison to the standard drug. However, the anthelmintic activity study revealed that both the extracts possess potent anthelmintic activitiys as compared to the standard drug, mebendazole.

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